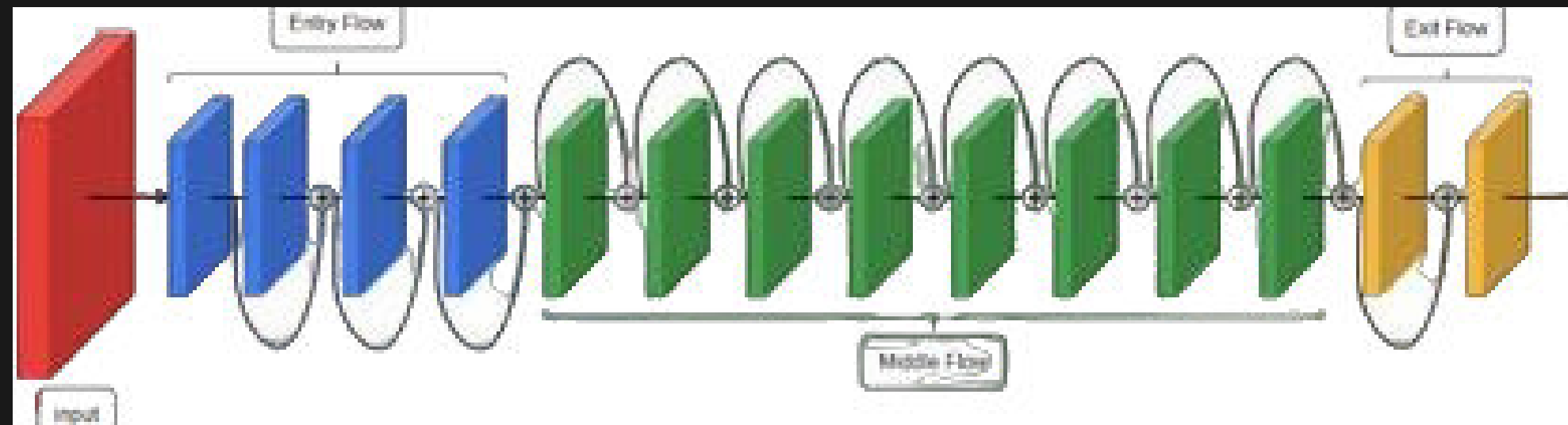


Weather Prediction System in Image using Xception-Net

What is Xception-Net?

Xception-Net is a powerful deep learning architecture designed for image classification tasks. It employs depthwise separable convolutions to improve performance while reducing computational cost, making it ideal for visual weather prediction applications.





Abstract

Weather recognition is a common problem for many branches of industry. For example self-driving cars need to precisely evaluate weather in order to adjust their driving style. Modern agriculture is also based on the analysis of current meteorological conditions.. Because any special sensors are needed, the system should be really cheap. Thanks to tranfer learning, it is possible to create image classification solutions using a dataset.

Thanks to transfer learning it is possible to create image classification solutions using a dataset. This weather prediction model is based on InceptionV3Xception-Net architectures.



Importance of Weather prediction Model

Accurate weather Prediction s crucial for public safety and economic stability. It helps in planning agricultural activities, managing resources, and preparing for extreme weather events, thereby minimizing losses and protecting lives.



How Xception-Net Works



Xception-Net utilizes a unique architecture that focuses on feature extraction and data representation and is a convolutional neural network that is 71. By breaking down images into essential components, it can learn complex patterns that are vital for predicting weather conditions effectively.



Existing System



Multiagent-Based Fuzzy Neuro Network

Neuro-fuzzy hybridization results in a hybrid intelligent system that combines these two techniques by combining the human-like reasoning style of fuzzy systems with the learning and connectionist structure of neural networks. Neuro-fuzzy hybridization is widely termed as fuzzy neural network (FNN) or neuro-fuzzy system (NFS) in the literature.





Proposed System

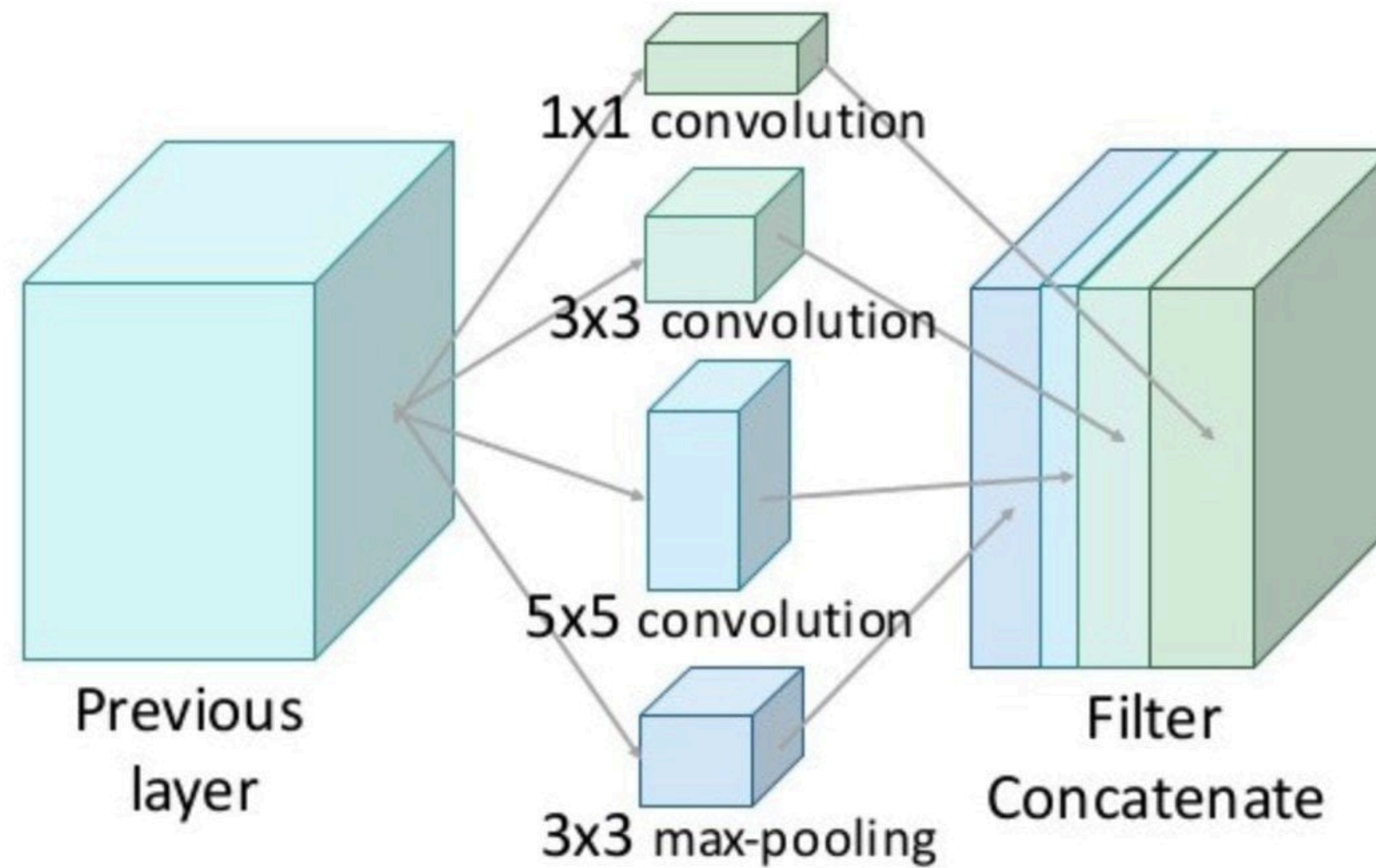
Xception-Net and Transfer Learning algorithm

Xception is a convolutional neural network that is 71 layers deep. You can load a pretrained version of the network trained on more than a million images

Transfer learning takes the relevant parts of a pre-trained machine learning model and applying it to a new but similar problem.



System Architecture:



Dataset Description

In our weather prediction system using Xception-Net, we have used suitable dataset which contain labeled images representing various weather conditions such as

- rain
- snow
- rainbow
- hail
- frost
- dew
- glaze
- fogsmog
- lightning
- sandstorm



Methodology

Algorithm :

1. Import Necessary Libraries
2. Load and Preprocess the Dataset - Gather a labeled dataset of images with weather categories such as "sunny," "cloudy," "rainy," "snowy," etc. Preprocess the images to resize them to 299×299 pixels
3. Load the Xception Model and Customize for Weather PredictionLoad Xception without the top layer to use it as a feature extractor.
Add a global average pooling layer and a dense layer for classification based on the number of weather classes.
4. Compile the Model
5. Train the Model - Train the model using the training and validation generators.
6. Evaluate the Model - Evaluate the model on a test set to measure its accuracy in predicting weather conditions from images.
- 7 . Use the Model for Prediction - Load an image, preprocess it, and use the trained model to predict the weather condition





Future of Weather Forecasting

The future of weather forecasting looks promising with the integration of **AI technologies** like Xception-Net. As we continue to refine these models, we can expect even greater accuracy and reliability in predicting weather events.



Conclusion:



In conclusion, a Weather Prediction System using Xception-Net demonstrates a powerful approach to classifying weather conditions from images, leveraging the high performance and efficiency of deep convolutional networks.

By training Xception-Net on a comprehensive dataset of weather-labeled images—such as sunny, cloudy, rainy, foggy, and snowy conditions—this system can accurately identify and predict the weather context of new images. For best results, a diverse and large-scale dataset, ideally with balanced classes and real-world variability, is essential.

Thanks!

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